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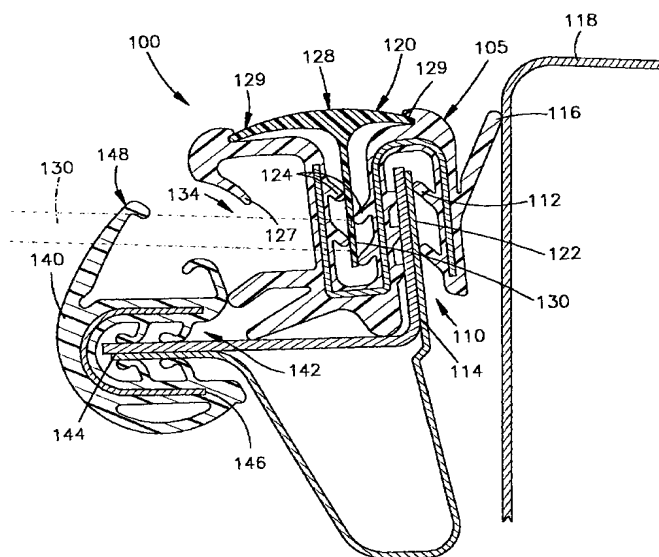
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[Continued on next page]

(54) Title: WINDOW SEAL ASSEMBLY



(57) Abstract: The apparatus of the invention provides a seamless daylight opening module (DLO) which includes glass run channels, outer belt seals and a full surround die cast piece. The apparatus of the invention has resulted in the elimination of joints, seams, metal fasteners and endcaps resulting in an improved aesthetic appearance as well as enhanced window sealing and an increase in the daylight opening. The module is shipped and installed as a combined unit reducing assembly time and assembly line space. The unique die cast piece can comprise various finishes such as low gloss black, high gloss black and chrome. With respect to maintenance, the glass runs and outerbelts can be replaced independently of the entire assembly.



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Title of the Invention

Window Seal Assembly

Field of the Invention

5 The present invention relates to an improved apparatus for a movable vehicle window module, and more particularly to an improved vehicle greenhouse window seal module having a die cast mold or trim member which is used in conjunction with an extruded rubber belt surrounding the greenhouse window.

10 **Background of the Invention**

In the design of modern vehicles such as automobiles, it is known to mount the windows in a substantially flush manner with respect to the vehicle in order to provide an attractive and streamlined appearance. One major disadvantage of typical prior art flush mounted window seal assemblies is that they generally require multiple pieces which need to be assembled together, thus requiring additional assembly time and assembly line space. Another disadvantage to these multi-piece window assemblies is that they result in multiple joints and seams as well as requiring multiple fasteners, weatherstrips and endcaps. With respect to aesthetics, prior art window seal assemblies have the disadvantages of a reduced daylight opening and an increase in the amount of the visible weatherstrips. In addition, a separate decorative molding is typically required in order to produce a more aesthetically pleasing window module. Thus it is desired to produce a one piece window seal assembly which requires no additional assembly for installation into the door and results in

elimination of joints, seams and endcaps and a reduction in fasteners while providing for an aesthetically pleasing window module.

Summary of the Invention

5 The apparatus of the invention provides a seamless daylight opening module (DLO) which includes glass run channels, outer belt seals and a full surround die cast piece. The apparatus of the invention has resulted in the elimination of joints, seams, metal fasteners and endcaps resulting in an improved aesthetic appearance as well as enhanced window sealing and an
10 increase in the daylight opening. The module is shipped and installed as a combined unit reducing assembly time and assembly line space. The unique die cast piece can comprise various finishes such as low gloss black, high gloss black and chrome. With respect to maintenance, the glass runs and outerbelts can be replaced independently of the entire assembly.

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Brief Description of the Figures

Figure 1 shows a front view of the window seal assembly of the present invention shown in use for a front door module;

Figure 2 is a cross-sectional view of the window seal assembly shown in
20 the direction 2-2 of Figure 1;

Figure 3 is a cross-sectional view of the window seal assembly shown in the direction 3-3 of Figure 1; and

Figure 4 is a cross-sectional view of the window seal assembly shown in the direction 4-4 of Figure 1.

Detailed Description of the Invention

Figure 1 is a schematic view of a front side door assembly of a vehicle such as an automobile which may incorporate sealing units according to the various embodiments of the invention. The front side door assembly is generally designated at 1 and includes a window 4 which is movable in a vertical direction. As is well known in the art, the window 4 is slidably received in vertical guide tracks in the door frame so as to be flush or substantially flush with the adjacent vehicle structure when the window is in its closed position. When the window is closed, its edges are adapted to be received within and engaged by the window seal assembly 10 or seamless daylight opening module of the present invention. The window seal assembly 10 functions to provide a seal between the window and the adjacent vehicle door structure; to secure the window when the vehicle is traveling; and to provide an aesthetically pleasing appearance. For a front door module as shown in Figure 1, the window seal assembly 10 comprises three main sections: the door frame header section 100, the B-Pillar section 200, and the glass outer belt section 300, which are shown in more detail in Figures 2-4, respectively.

As shown in Figure 2, the front door frame header section 100 comprises a first sealing member 105 and a second sealing member 140. The first sealing member 105 includes a first U shaped channel 110, a second U shaped channel 120, and a glass run channel 134. The first U shaped channel has finger-like projections 112 protruding from the inner sidewalls of the channel for retaining and sealing a pinch welded door frame 114 of a vehicle (not shown). An outer arm 116 laterally extends from the sealing member 105

for sealing the outer door or roof frame 118 of the vehicle. The second U shaped channel 120 is positioned in an inverted relationship with respect to the first U shaped channel 110, i.e., such that the openings of each channel face opposite directions. The channels 110, 120 share a common inner wall 115
5 such that they cooperate to form a generally S cross-sectional shape. Positioned within the interior of the sealing member 105 is an internal S shaped reinforcement member 122.

The sealing member 105 further comprises a T shaped trim member 120 which has a lower end or stem 122 received within the second U shaped
10 channel 120 and which is secured by fingerlike projections 124 which extend from the interior walls of the channel. The upper portion or tee end 124 has one end received within a groove 129 formed in the outer wall of the first U shaped channel, and the second end is received within a groove of an arm 125 extending perpendicular from the outer wall of the second U shaped channel
15 120. The arm 125 together with the outer wall 128 of channel 120 and projection 136 which extends from the outer wall of the second channel, together form a glass run channel 134 for receiving a movable glass run 130.

The sealing member 105 further comprises a glass run channel 134 for receiving a glass run 130. Channel 134 has one channel wall formed by leg 125
20 which extends perpendicular from the wall of channel 120, and the opposite channel wall is formed by legs which extend from the lower end of the U shaped channel 120. Leg 125 has a lip 127 extending therefrom for being in sealing engagement with a movable glass run 130. The second channel 120 further comprises several finger like projections 124 for receiving and retaining

the leg 126 of a T shaped die cast part 128. The T portion of the die cast part is received within grooves 129 of the sealing member 100, and provides structural support to the leg 125. The door frame header section further comprises a second U shaped part 140 having a U shaped channel 142 for receiving a distal
5 end 144 of the door frame with an internal U shaped reinforcement member 146 encased in extruded rubber. The second part 140 has an exterior armlike projection 148 extending from the channel for sealing the glass run 130.

The sealing member 105 may comprise a flexible, durable polymeric material or suitable thermoplastic or thermoplastic elastomeric material such as
10 EPDM which is a copolymer of ethylene and propylenediene. The sealing member 105 may be formed by extrusion or other suitable method. The T shaped trim member 120 is preferably a die cast part and is preferably comprised of zinc, PCABS or plastic materials. The trim member 120 may additionally be powder coated or painted to the desired color.

15 As shown in Figure 1, the window seal assembly 10 further comprises a B pillar section 200. The B pillar section 200 as best shown in Figure 3, comprises a glass run U-shaped channel 210 formed of extruded rubber and having opposed finger like projections 212a, 212b for sealing the glass run 130. The B pillar section 200 is secured to the door frame 114. The B pillar section
20 200 further comprises a trim channel 216 located perpendicular to the glass run channel 210 and having opposed fingerlike projections 218 for receiving and retaining the leg 222 of a trim member 220 within the channel. The trim channel 216 preferably has a U shaped reinforcement member embedded therein. The trim member 220 has an elongated T shaped portion 224 having ends 226, 228

which curve about the door frame 114 and the B pillar section 200, respectively.

The trim member 200 may be further fastened to the door frame 114 via fasteners 229. The trim member 220 preferably is die cast metal which may be finished a number of aesthetically pleasing ways such as low gloss black, high
5 gloss black, and chrome.

As shown in Figure 1, the window seal assembly 10 further comprises a glass outer belt section 300. As shown in more detail in Figure 4, the glass outer belt section 300 of the window assembly comprises an inverted J-shaped reinforcement member 310 with extruded rubber 311 molded thereto, and
10 further comprises projections 312, 314 forming the outer belt seal attached thereto. The curved portion of the reinforcement member 310 forms a U shaped channel 316 which has an extruded rubber inner layer with fingerlike projections 318 extending therefrom for receiving the leg 322 of a trim member 320. The leg 322 of the trim member is connected to an integrally formed
15 curved piece 324 which forms the decorative trim.

The above three sections 100,200,300 are connected together to form the window seal assembly for front door module as shown in Figure 1. The above described window seal assembly is an improved design over the prior art resulting in a module shipped as a combined molding-glassrun-
20 weatherstrip which allows for reduced installation labor and improved sealing. The trim member is a single piece die casting which is made with no exposed joints on the molding. The appearance of the seal has been improved since the die cast part may comprise various attractive finishes as well as reducing the amount of visible rubber.

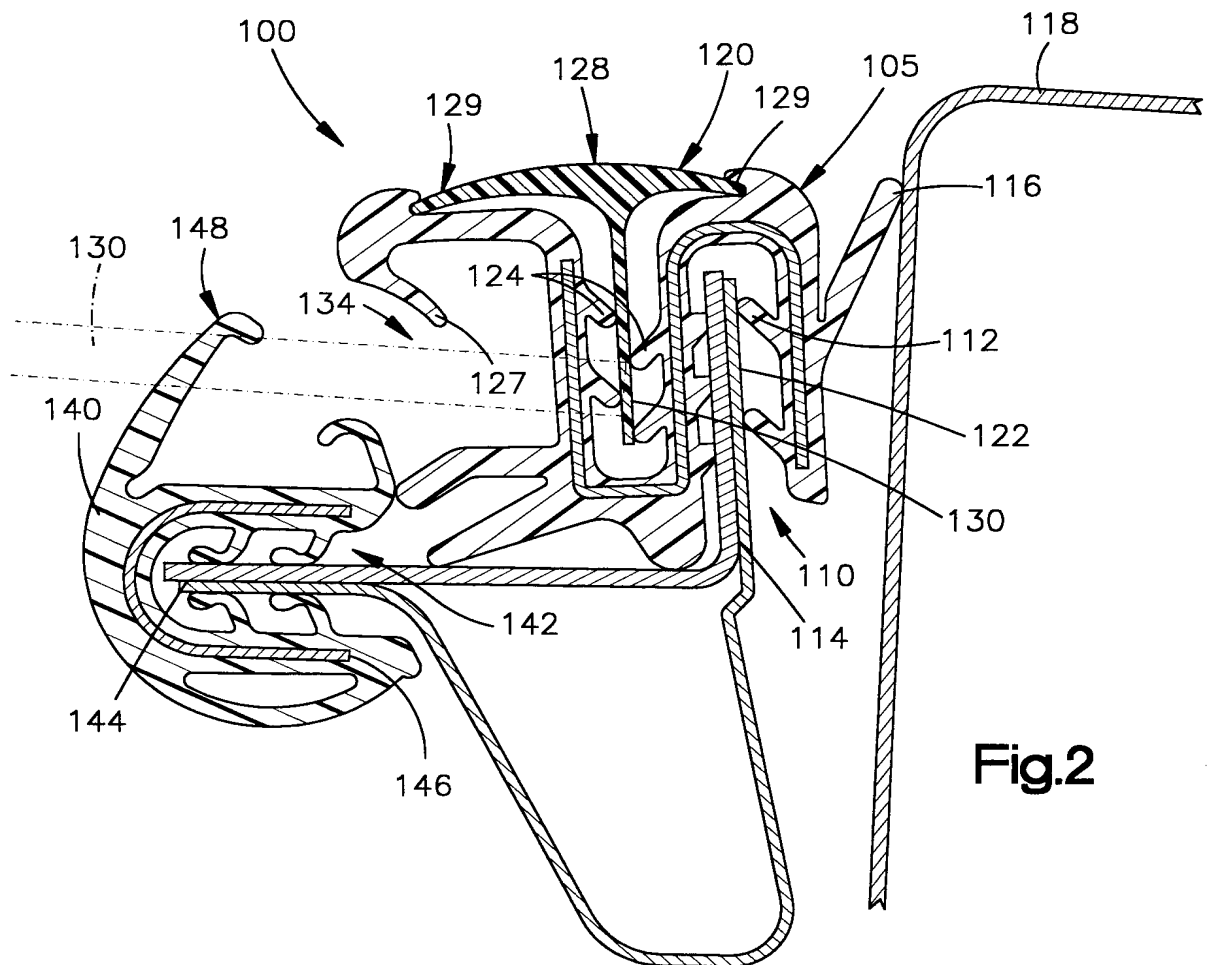
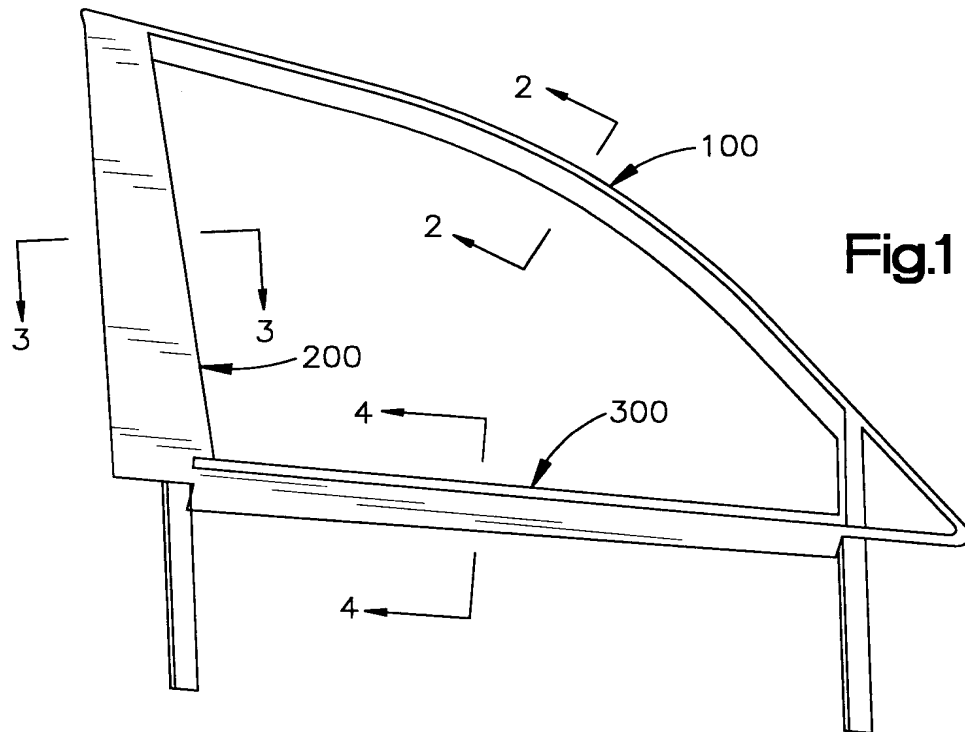
While what has been described constitutes presently preferred embodiments, the invention could take numerous other forms. For example, although the preferred embodiments are described in connection with a movable window of a front automobile door, it may be utilized in connection with any
5 movable window of any vehicle in other applications. Also the particular cross-sectional shape and configuration of the sealing member can be varied in many ways without departing from the invention. Because the invention can take on numerous other forms, it should be recognized that the invention should only be limited insofar as is required by the scope of the following claims.

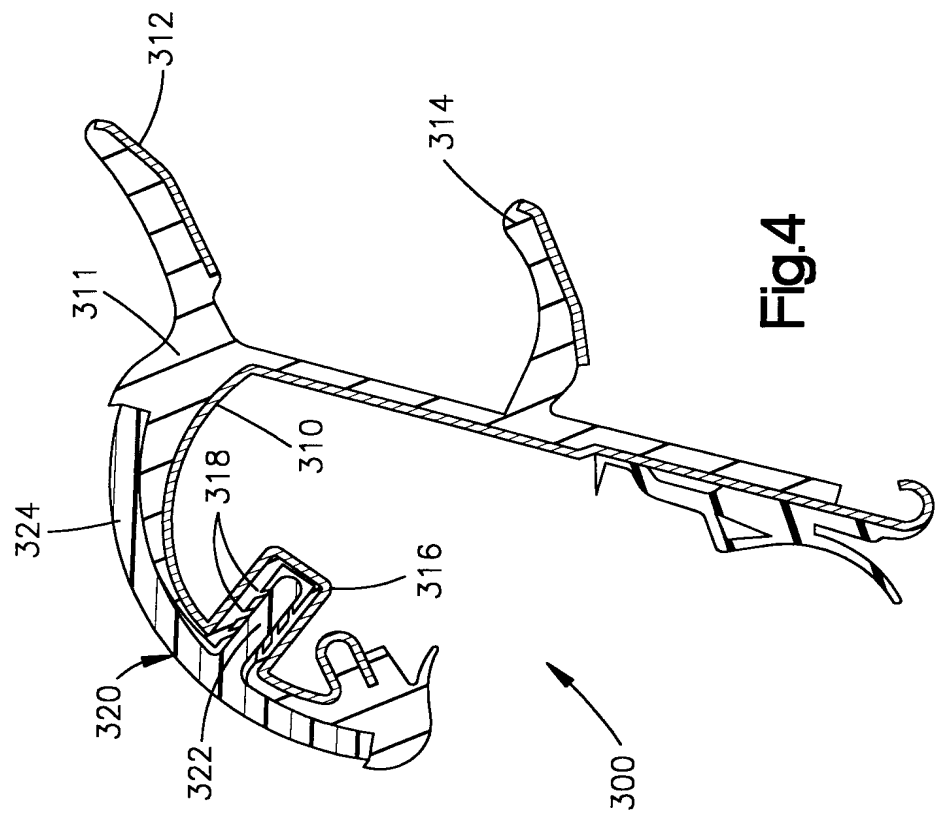
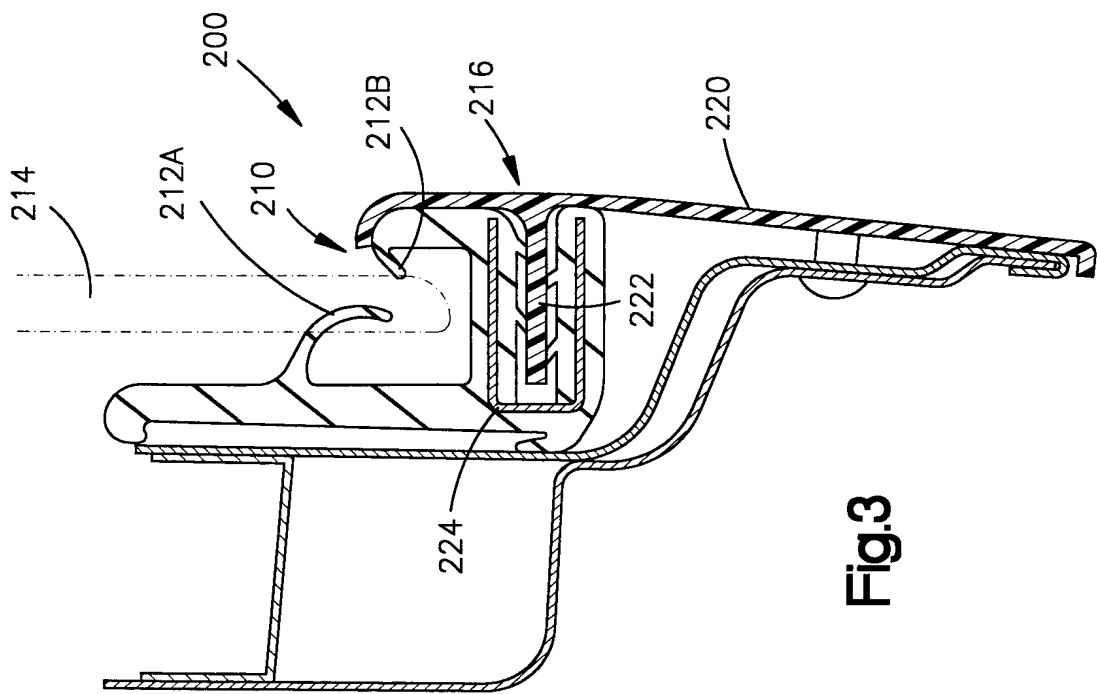
I claim:

1. A window seal assembly mountable to a door frame of a vehicle for providing a seal between the movable window and the frame, said window seal assembly comprising:
 - 5 an elongated flexible sealing member including a first portion for mounting said assembly to said frame, and a glass run portion for receiving a portion of said movable window;
a trim member having a first end for connecting to said elongated flexible sealing member, and a second curved end;
 - 10 wherein said window seal assembly provides a seal between said frame and said movable window.
2. The seal assembly of claim 1 wherein said first portion and said glass run portion of said elongated flexible sealing member comprise generally U shaped portions which are positioned in an inverted relationship with respect to
15 each other.
3. The seal assembly of claim 1 wherein said trim member is T shaped.
4. The seal assembly of claim 1 wherein said trim member is die cast.
5. The seal assembly of claim 1 wherein said trim member comprises zinc, plastic, or PCABS.
- 20 6. The seal assembly of claim 1 wherein said trim member is T shaped, and end of said upper T section are received within grooves of said elongated flexible sealing member.
7. The seal assembly of claim 1 wherein said elongated flexible sealing member has an internal reinforcement member.

8. The seal assembly of claim 1 wherein said trim member is removable.
9. The seal assembly of claim 1 wherein said trim member is T shaped, and the upper T section is powder coated.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/31074

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : E06B 7/16

US CL : 049/490.1, 475.1

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 049/490.1, 475.1, 495.1, 440, 441

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,743,047 A (BONNE et al.) 28 April 1998, whole document.	1-6, 8 and 9
Y	US 3,742,649 A (DOCHNAHL) 03 July 1973, whole document.	7
A	US 5,702,148 A (VAUGHAN et al.) 30 December 1997, whole document.	1-9
A	US 5,475,947 A (DUPUY) 19 December 1995, whole document.	1-9
A	US 4,625,459 A (WARNER) 02 December 1986, whole document.	1-9

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

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Date of mailing of the international search report

26 APR 2001

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DERWENT-ACC-NO: 2001-329125**DERWENT-WEEK:** 200807*COPYRIGHT 2008 DERWENT INFORMATION LTD*

TITLE: Window seal assembly for vehicles, has T-shaped trim unit with curved top end and made of powder coated zinc, plastic or PCABS material, located within groove of long flexible sealing unit

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PATENT-ASSIGNEE: GENCORP INC[GENT] , GDX NORTH AMERICA
INC[GDXNN]

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PUB-NO	PUB-DATE	LANGUAGE
WO 0134933 A1	May 17, 2001	EN
AU 200116008 A	June 6, 2001	EN
EP 1232318 A1	August 21, 2002	EN
CZ 200201710 A3	April 16, 2003	CS
CN 1408045 A	April 2, 2003	ZH
EP 1232318 B1	August 10, 2005	EN
DE 60021910 E	September 15, 2005	DE
DE 60021910 T2	April 6, 2006	DE
ES 2243325 T3	December 1, 2005	ES
CN 1272194 C	August 30, 2006	ZH
CN 101016823 A	August 15, 2007	ZH

DESIGNATED-STATES : AE AG AL AM AT AU AZ BA BB BG BR BY
 BZ CA CH CN CR CU CZ DE DK DM DZ EE
 ES FI GB GD GE GH GM HR HU ID IL IN
 IS JP KE KG KP KR KZ LC LK LR LS LT
 LU LV MA MD MG MK MN MW MX MZ NO NZ
 PL PT RO RU SD SE SG SI SK SL T J TM
 TR TT TZ UA UG US UZ VN YU ZA ZW AT
 BE CH CY DE DK EA ES FI FR GB GH GM
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 SD SE SL SZ TR TZ UG ZW AL AT BE CH
 CY DE DK ES FI FR GB GR IE IT LI LT
 LU LV MC MK NL PT RO SE SI AT BE CH
 CY DE DK ES FI FR GB GR IE IT LI L U
 MC NL PT SE

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WO2001034933A1	N/A	2000WO- US31074	November 13, 2000
CN 1408045A	N/A	2000CN- 816658	November 13, 2000
CN 1272194C	N/A	2000CN- 816658	November 13, 2000
DE 60021910E	N/A	2000DE- 621910	November 13, 2000
DE 60021910T2	N/A	2000DE- 621910	November 13, 2000
EP 1232318A1	N/A	2000EP- 978554	November 13, 2000
EP 1232318B1	N/A	2000EP- 978554	November 13, 2000
EP 1232318A1	N/A	2000WO- US31074	November 13, 2000
CZ 200201710A3	N/A	2000WO- US31074	November 13, 2000
EP 1232318B1	N/A	2000WO- US31074	November 13, 2000

DE 60021910E	N/A	2000WO- US31074	November 13, 2000
DE 60021910T2	N/A	2000WO- US31074	November 13, 2000
AU 200116008A	N/A	2001AU- 016008	November 13, 2000
CZ 200201710A3	N/A	2002CZ- 001710	November 13, 2000
CN 101016823A	Based on	2006CN- 10103041	November 13, 2000

INT-CL-CURRENT:

TYPE	IPC DATE
CIPP	B60J10/00 20060101
CIPP	B60J10/06 20060101
CIPP	E06B7/22 20060101
CIPS	B60J10/00 20060101
CIPS	B60J10/02 20060101
CIPS	B60J10/04 20060101
CIPS	B60J10/04 20060101
CIPS	B60J10/08 20060101
CIPS	B60J10/08 20060101
CIPS	E06B7/16 20060101

ABSTRACTED-PUB-NO: WO 0134933 A1**BASIC-ABSTRACT:**

NOVELTY - A T-shaped trim unit (120) having curved T end and made of powder coated zinc, plastic or PCABS material, is received within groove of long flexible sealing units (105,140). One portion of the sealing unit mounts a window seal assembly to a door frame (114), and

a glass run (130) receives a movable window. The window seal assembly provides sealing between the frame and the movable window.

USE - For vehicle windows.

ADVANTAGE - Enhances window sealing, increases daylight opening due to the elimination of joints, seams, metal fasteners and end caps, etc.

DESCRIPTION OF DRAWING(S) - The figure shows the perspective cross-sectional view of window seal assembly.

Sealing units (105,140)

Door frame (114)

T-shaped trim unit (120)

Glass run (130)

CHOSEN-DRAWING: Dwg.2/4

TITLE-TERMS: WINDOW SEAL ASSEMBLE VEHICLE SHAPE TRIM
UNIT CURVE TOP END MADE POWDER COATING
ZINC PLASTIC MATERIAL LOCATE GROOVE
LONG FLEXIBLE

DERWENT-CLASS: A95 Q12 Q48

CPI-CODES: A99-A;

SECONDARY-ACC-NO:

CPI Secondary Accession Numbers: 2001-101034

Non-CPI Secondary Accession Numbers: 2001-236857